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Operational and Mission Highlights

A MONTHLY SUMMARY OF TOP ACHIEVEMENTS

September 2021

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NUCLEAR SECURITY

CVD Project at CMR Ships First Vessel

Laboratory personnel working on a years-long Confinement Vessel Disposition (CVD) Project at the Chemistry and Metallurgy Research (CMR) facility recently shipped its first vessel after closing the emptying and dispositioning portion of the project in 2020. During the 1970s and 1980s, the Laboratory conducted experiments that produced data used in computer modeling. Scientists used these models to evaluate the performance of nuclear weapons.

During these experiments, six-foot sealed steel vessels were used to contain the blast and associated radioactive material. The CVD project removes the contents of these legacy six-foot-diameter vessels, recycles the useful material, and dispositions the balance of the material as waste. Personnel conducting the CVD process exercise commitment to safety, security, and the protection of the environment.

In December 2020, the tenth and final vessel was confirmed empty of transuranic waste and moved to staging, thereby demonstrating the successful disposition of legacy plutonium material that had been staged onsite in these confinement vessels for more than 40 years. On August 26, 2021, the first vessel shipment was successfully sent offsite, setting the stage for future emptied CVD waste shipments.

Meeting FY21 milestones, this shipment opens the door for the future shipment of the balance of the plutonium-contaminated sphere and sets a precedent for oversized waste shipments across the complex. Future shipments will ensure that these legacy vessels are removed from the CMR facility and relocated to an appropriate destination, thus supporting the subsequent closure of CMR.

Laboratory HPC Teams Increase ASC Platform Availability and Use

This past year, FY21, High Performance Computing (HPC) teams greatly reduced the number of times that Advanced Simulation and Computing (ASC) computers at the Laboratory were taken offline, thus significantly increasing the availability of the ASC platform used as part of the Stockpile Stewardship Program.

Dedicated Systems Times (DST) are scheduled outages of HPC systems used to address software and hardware problems that if left unresolved could result in longer, unplanned outages. Personnel use DSTs to address a variety of tasks in a complex infrastructure, such as facility/cooling, electrical, network, and hardware maintenance, as well as software upgrades and security patching. The most recent DST took place on August 31, 2021. Known as the Trinity (tri-lab system) maintenance outage, this DST proved so productive that additional work was incorporated, thus reducing future, previously scheduled outages. For example, the scheduled September 7, 2021, outage was cancelled, as was a future weeklong outage.

HPC operations and platforms teams have taken a strategic approach to pre-schedule and overlap HPC maintenance weeks-to-months in advance. In addition, DST tasks are prioritized and reviewed every week. This coordination and prioritization has reduced the overall number of DSTs while increasing platform availability. The team has also modified processes that enable minor configuration and software changes to be done live, thus enabling changes and fixes to propagate without a full outage.

Mark Anthony Named New Associate Laboratory Director for Plutonium Infrastructure

Starting November 1, 2021, Mark Anthony will lead the newly created Associate Directorate for Plutonium Infrastructure (ALDPI). Anthony has more than 32 years of experience leading complex technical organizations with significant fiscal and programmatic responsibilities.

Anthony will move to New Mexico from Lund, Sweden, where he currently serves as a project director for European Spallation Source, a $3.8 billion effort to build and operate the world's most powerful neutron source for the European Research Infrastructure Consortium. The project is now 82% complete, and that's largely due to Anthony's direct leadership style, which he said involves communicating candidly, promoting strong managers, and negotiating with stakeholders without compromising standards.

New, Very Fast Radiation Transport Capability Used on the Laboratory's ASC Codes

Laboratory personnel have implemented a high-fidelity Compton treatment in CAPSAICIN, a deterministic radi-

ation-transport package that is now available for use in the Laboratory's Advanced Simulation and Computing (ASC) Program. The Transport Integrated Codes Project team responsible

for this work included Jon Dahl, Jae Chang, and Andrew Till, all of Computational Physics and Methods (CCS-2).

This verified high-fidelity implementation effort provides a benchmark from which to compare against lower-fidelity methods. The current capability consists of a reimplementation using new data structures that is tens to hundreds of times faster than the original proof-of-concept capability. The new implementation resulted in a 58x speedup of the SN radiation transport with Compton and a 6.2x speedup of the entire simulation.

This new capability will enable predictive simulations with fewer approximations for challenging high-energy-density physics (HEDP) problems, advancing the frontiers of the ASC Program and its mission to support science-based stockpile stewardship.

Power Supply and Pit Surveillance Programs Surpass Milestones

The Laboratory's Power Supply Surveillance Program has surpassed all FY21 Level 2 Milestones. The program successfully completed all surveillance requirements for the Sandia National Laboratories Design Agency (SNL-DA) while also completing three additional Significant Finding Investigations surveillance tests. The dedicated efforts by personnel in Heat Source Technologies (AMPP-1) and Nuclear Materials Science (MST-16) were exemplary — for the first time since FY13, the program exceeded all milestones.

The Pit Surveillance Program also in FY21 met all committed L2 Milestones. This program doubled output for pit surveillance testing compared to output from the past eight previous years, despite challenges associated with the COVID-19 pandemic and priorities associated with Plutonium Modernization. Early in FY21, the program initiated a process improvement effort in collaboration with the Laboratory's Design Agency (DA) and made significant improvements compared to previous fiscal years. The program will continue to make improvements to ensure continued success and alignment with surveillance requirements stipulated by the Laboratory's DA.

In FY21, the Pit Technologies Division Office (PT-DO), MST-16, Production Agency Quality (PAQ), and the Laboratory's DA did a great job improving program execution.

TA-55 40-mm Gun Shot 55-537 Successful

On August 26, 2021, the Laboratory successfully executed the TA-55 40-mm Gun Shot 55-537. This multi-sample experiment measured shockwave-driven ejecta velocity with a 16-channel Photonic Doppler Velocimetry system and ejecta pin diagnostics. Scientists will use the data from these experiments to validate ejecta physics models in Advanced Simulation and Computing codes used to assess weapons performance.

SCIENCE, TECHNOLOGY, AND ENGINEERING

Cerium Experiments Advance Equation of State and Understanding of Cerium Stress-Strain Relationship Under High-Pressure Conditions

During the week of August 16, 2021, the Los Alamos Neutron Science Center's Proton Radiography facility executed two cerium experiments.

The first experiment studied the strength of cerium with an in situ time-resolved measurement of density under shock loading. Researchers will use these measurements to constrain the multiphase equation of state for cerium.

The second experiment is part of a multi-year series conducted in collaboration with Sandia National Laboratories. This experiment used shock-driven instability growth to measure the strength of cerium oxide (CeO_2) under high-pressure conditions.

Laboratory Archeologist Wins Award at Pecos Conference

In early August 2021, a team of Laboratory archeologists traveled to Mancos, Colorado, to participate in the annual Pecos Conference, a gathering of experts and students involved with southwestern archeology. Organized in 1927 by pioneering archaeologist A. V. Kidder, the Pecos Conference established the first widely accepted cultural classification for southwest archaeology.

One of the conference's cornerstone events is the prestigious Cordell and Powers Prize competition, which awards prizes for the best extemporaneous talks presented by archaeologists 35 years of age or younger. Representing the Laboratory in the competition this year was Ali Livesay, an archeologist with the Environmental Stewardship group. Livesay won second place with a discussion titled "A Real Labor or Love: Archaeologies of the Heart at Los Alamos National Laboratory."

Livesay and her colleagues also engaged with attendees at the Pecos Conference, sharing the type of work taking place at the Laboratory — some of this work was likely unfamiliar to most of the conference attendees.

Laboratory Helps Uganda Sequence SARS-CoV-2 for Biosurveillance

During the week of August 16, 2021, the Uganda Virus Research Institute (UVRI) sent a report to the country's Ministry of Health, the Centers for Disease Control and Prevention, and WHO (World Health Organization)-Uganda. This report detailed UVRI's success in sequencing genomes for SARS-CoV-2, the virus responsible for the COVID-19 pandemic. Laboratory scientists collaborated with UVRI to sequence these viral genomes for applications in biosurveillance.

Scientists in the Laboratory's Bioscience Division have been working with UVRI researchers for a number of years through the Defense Threat Reduction Agency's Cooperative Threat Reduction program. The Laboratory first helped UVRI set up in-house sequencing equipment. And second, over the next 18 months, Laboratory scientists mailed UVRI reagents and conducted virtual training classes to help Ugandan scientists learn how to perform high-quality sequencing data.

Full genome sequencing is critical for tracking new variants as the virus mutates and evolves. However, this capability is not readily available in every corner of the world. For this reason, the Laboratory and the Cooperative Threat Reduction program are committed to helping countries like Uganda gain self-sufficiency for local, timely biosurveillance.

Laboratory's Research Related to "Fire Clouds" Explained in Scientific American

In an article published in *Scientific American* on September 1, 2021, Laboratory scientists Jon Reisner (Continuum Models and Numerical Methods) and Manvendra Dubey (Earth System Observations) discuss "fire clouds." Caused by wildfires, these fire clouds, formally known as pyrocumulonimbi, can trigger lightning, create fire tornadoes, and turbocharge winds that accelerate the spread of fire.

The authors write about how megafires and their blanketing haze have become an increasingly familiar sight in recent years, yet scientists are only beginning to learn what causes fire clouds, what is in such clouds, and what effects such clouds have on weather and the climate. Through a combination of field observations, experimental work in the laboratory, and computer modeling at local to global scales, the researchers are making progress in understanding the mechanisms and climate impacts of pyrocumulonimbus from recent megafires in British Columbia (2017) and Australia (2019–2020).

The Laboratory uses data to validate and refine its computer models, called HIGRAD and FIRETEC. Together, these computer tools help scientists study how fire moves across the landscape and interacts with the atmosphere. The models then incorporate the results into global climate models.

Laboratory Team One of Ten Awarded a $26 Million DOE Grant

A research team at the Laboratory has been selected to receive a highly competitive $26 million DOE grant to advance chemical and materials sciences by applying data science. The goal of this DOE program is to harness advanced research tools to new scientific discoveries that are fundamental to clean-energy solutions.

Principal investigator Kipton Barros of the Lab's Theoretical Division will lead a multidisciplinary team of researchers on a three-year project in collaboration with the California Institute of Technology (Caltech). This team will apply data science — including artificial intelligence and machine learning (AI/ML) — to advance the understanding of chemical and materials systems.

The team will use data science to explore three main areas in chemical and materials systems:

- the self-assembly of soft materials (materials like plastic that respond easily to heat and other factors),
- the chemical processes of catalysis (a substance used to advance a chemical reaction), and
- the role of stimuli (such as laser light) and external influences that help drive the outcome of chemical processes.

The project will build models and simulations that can be applied in experiments. Ultimately, the resulting predictive AI/ML models, validated through experimentation, will accelerate the discovery of new chemistry and materials systems with exceptional properties and functionalities. The benefits of the research include better materials for solar cells to improved catalysts used for chemical applications to the discovery of new drugs.

Research Integrity — New Website Offers Guidance

The Research Integrity Office (RIO) has launched a new Research Integrity website to help Laboratory employees build and maintain their knowledge and practice of research integrity. Located within the Lab's Science Research Office, the RIO provides guidance to the Laboratory community on integrity in science, technology, and engineering.

Research integrity is an important focus area for the Laboratory, and as such, employees are responsible for upholding the highest standards in conduct of research. The website defines research integrity and provides information on authorship standards. Among other topics, the website covers the definition of misconduct, including related DOE regulations on research misconduct.

Researchers Develop Qubit-Efficient Quantum Algorithms Used for Entanglement Spectroscopy

Yigit Subasi of Information Sciences (CCS-3), along with Justin Yirk (a 2019 Quantum Computing Summer School participant), recently published the paper "Qubit-efficient entanglement spectroscopy using qubit resets" in the journal *Quantum*. The article discusses qubit-efficient quantum algorithms for the task of Entanglement Spectroscopy, where qubit resets are used to fit large problem instances onto small chips.

The algorithm has been successfully implemented on Honeywell's quantum computer. Code used for numerical simulations was also released and is available on GitHub.

Special-Issue Paper Reviews CoPA Particle Application Advancements

The efforts of the Laboratory's Exascale Computing Project (ECP) in preparing particle applications for exascale were recently published in a special issue of the *International Journal of High Performance Computing Applications*. ECP's Co-design Center for Particle Applications (CoPA) aims to prepare particle applications to conduct exascale computing.

CoPA provides proxy applications (apps) and libraries that enable exascale readiness. Research under CoPA focuses on submotifs that address (1) short-range particle – particle interactions, which often dominate molecular dynamics (MD) and smoothed particle hydrodynamics methods; (2) long-range particle – particle interactions used in electrostatic MD and gravitational N-body methods; (3) particle-in-cell methods; and (4) linear-scaling electronic structure and quantum molecular dynamics algorithms.

CoPA projects have demonstrated that proxy apps are beneficial for rapid prototyping of different ideas and performance speedup. Moreover, CoPA has demonstrated that co-design teams of domain scientists, computational scientists, and expert programmers in hardware-specific languages and programming models are an effective work mode for advancing particle applications.

The following scientists worked on the paper, along with collaborators from other laboratories and universities: lead author Susan Mniszewski (CCS-3, Information Sciences) and co-authors Michael Wall (CCS-3), Christoph Junghans (CCS-7, Applied Computer Science), Adetokunbo "Toks" Adedoyin (CCS-7), Jamal Mohd-Yusof (CCS-7), Christian Negre (T-1, Physics and Chemistry of Materials), and Guangye Chen (T-5, Applied Mathematics and Plasma Physics).

Updated Space Weather Model Improves Predictions of Radiation Storms

Laboratory scientists have updated a machine-learning computer model designed to accurately predict radiation storms caused by the Earth's Van Allen belt.

This updated model gives researchers more reliable two-day forecasts of the satellite-damaging radiation storms in this area. This scientific research was published in the journal Space Weather.

High-speed electrons inside the Earth's outer Van Allen belt pose a major radiation threat to satellites because they can disrupt their electronic components. For example, satellites operating in orbits with high-altitude apogees are prone to severe radiation storms of "killer" electrons. These satellites include navigation satellites, such as GPS and communication satellites in geosynchronous orbit.

Using data from NASA's Van Allen Probes mission, the research team evaluated 32 supervised machine-learning models in four different machine-learning classes, introduced the ensemble forecasting technique, and successfully demonstrated the performance of the updated model.

MISSION OPERATIONS

Decreased Risk of Glove Breach, Thanks to a New Safety Solution

The Laboratory's Pit Technologies Division implemented a process improvement that decreases the risk of a glove breach and reduces job time by 1–2 hours. During a drumout the week of September 13, 2021, the Logistics Team person in charge (PIC) took advantage of a questioning attitude and ascertained that the original process designed to handle sharp items posed an unnecessary risk with respect to possible glove breaches.

The original process involved first removing tape from the edges of sharp items to perform a visual inspection. And second, personnel reapply the tape to the sharp edges before such items are bagged out. To increase safety, the PIC recommended introducing a SAVY container into the process before removing tape for the visual examination. Instead of reapplying the tape, personnel place the items with sharp edges into the SAVY. The SAVY is then disposed of directly into a drum using the drumout port. This improvement increases both safety and efficiency in support of the pit production mission.

Environmental Protection and Compliance releases Newest Waste Compliance and Tracking System

On September 14, 2021, the Environmental Protection and Compliance Division released version 3.0 of the Waste Compliance and Tracking System (WCATS 3). Like the current WCATS, this newly re-engineered WCATS 3 will enable personnel to manage waste from point of generation to final disposition across all Laboratory technical areas. Both Triad National Security, LLC, and N3B use WCATS. DOE approved WCATS 3 for implementation on August 19, 2021.

A web-based application, WCATS 3 replaces aging software and provides functionality that enables users to customize view and font size, as well as show multiple profiles at once. Developing the new system's architecture and technology has taken years of meticulous planning and execution. Designers have structured WCATS 3 to enable further enhancements and improvements as requested by waste generators and other customers throughout the DOE Complex.

Finance Division Transitions to a Hybrid Onsite Presence to Support Technical Customers

Over the summer, the deployed groups in the Laboratory's Finance (FIN) Division — Science Technology & Engineering Finance and Weapons Finance — began a deliberately slow return to work onsite while continuing to telework. Moving toward a hybrid posture required coordination with FIN's technical customers to understand their expectations and to consolidate office spaces at some locations.

In July 2021, FIN personnel returned onsite one day per week to enable these employees to adapt to their new routines and settings. For example, staff members left their offices in March 2020 — when government cell phones were allowed in Q-cleared buildings — only to return in July 2021, after government cell phones were prohibited in those buildings and are now left in vehicles to avoid security incidents. In other cases, additional awareness regarding Bluetooth devices and Wi-Fi settings was required to adapt securely to new onsite operations.

FIN expanded to a twice-weekly onsite presence in August 2021 to effectively support technical custom-

ers. This change has been particularly valuable for new hires who have not been onsite since being hired after March 2020; being onsite has reinforced many new-hire training topics. As the Laboratory continues toward 100 percent effectiveness, deployed FIN staff will embrace a hybrid model to provide in-person and remote support to their host organizations and technical customers.

Human Resources Implements 60 Days to Hire initiative in Weapons Program and Capital Projects

As part of its overall hiring strategy, the Laboratory's Human Resources (HR) Division is working to improve its time-to-hire metric. The objective of this improvement is to ensure that job candidates receive a verbal employment offer within 60 days of a position's posting in the Laboratory's iRecruitment system. Through this 60 Days to Hire Initiative, HR aims to

- respond quickly to hiring needs in support of the Lab's 30 pits-per-year objective,
- support the Lab's Excellence in Operations strategic goal 3.4 — Implement systematic process improvement to drive increased rigor and efficiency in work execution, and
- build closer partnerships with the Lab's hiring organizations.

The Laboratory's Weapons Program and Capital Projects directorates were the first to implement a 60 Days to Hire Initiative designed to target areas of concern in the hiring process. HR collaborated with hiring managers and provided strategies and tools to quickly screen, interview, and select job candidates. At the end of the pilot, the overall hiring cycle time went from 125 days to 53 days.

HR is using the lessons learned from the pilot to improve its services, such as providing management with real-time access to applicant and hiring data, creating iRecruitment-system job aids, and developing new training for HR generalists and hiring managers.

Integrated Work Management training Consolidated to One Course

The Readiness Training Division (from the Associate Laboratory Directorate for Facilities & Operations), working with Institutional Training Services (from Human Resources), have deployed a new Integrated Work Management (IWM) course. This one-hour course is titled Course 52214: IWM – Understanding Your Role and Responsibilities. This course consolidates and replaces courses 31881–31884. The new UTrain course includes interactive, web-based content and a 15-question quiz.

The Laboratory's former policy required anyone using the IWM process to complete the IWM training courses as a one-time requirement. The updated policy requires anyone using the IWM process to complete the new consolidated course as initial training, along with a required refresher training every three years. The new IWM course is more interactive and user-friendly, covers the entire IWM work cycle for all roles within the IWM process, and reflects the updated P300 policy.

Laboratory's Acquisition Services Management Awards Nine Subcontracts to I-WEST Partners

Acquisition Services Management recently awarded nine subcontracts to partners that make up the Intermountain West Energy Sustainability and Transitions (I-WEST) team. These partners will collaborate with the Laboratory and the National Energy Technology Laboratory to develop a technology roadmap to transition the Intermountain West region to a carbon-neutral energy system. Furthermore, the collaborators will engage with stakeholders in their respective states to build coalitions to deploy the tech roadmap within the next 15 years.

Sponsored by DOE's Office of Fossil Energy and Carbon Management, the I-WEST initiative aligns with President Biden's energy plan to attain a net-zero-emissions economy no later than 2050 and to prioritize environmental justice. I-WEST addresses both challenges with a place-based approach to achieving carbon neutrality in the Intermountain West, focusing on technologies that are regionally relevant and take into consideration the unique attributes of each partnering state. The Intermountain West region consists of Arizona, Colorado, Montana, New Mexico, Utah, and Wyoming.

As a lead research institution, the Laboratory will serve as the prime contract holder. I-WEST subcontract awardees consist of the following: Arizona State University, Colorado School of Mines, Montana State University, New Mexico Tech, Resources for the Future, San Juan College, University of New Mexico, University of Utah, and University of Wyoming.

Laboratory's Benefits Group Unveils New Website

The Laboratory's Human Resources Benefits (HR-B) group has launched a new, fully rebranded, one-stop-shop website. Content for this new site has been completely reorganized for a streamlined user experience. Additionally, the site emphasizes ease of use and simplicity, so users can quickly find what they need. New content includes the following:

- Must-know information on all available benefits — whether users are enrolling for the first time or considering a change during Open Enrollment.
- More resources like how-to guides on what benefit changes users can make for a qualifying life event (e.g., getting married or having a child).
- Modern design with a simpler search capability.
- Intuitive navigation and topic structure.
- Adherence to the new Laboratory brand and user experience standards.

Laboratory's Sustainability Manager Receives DOE Award

Monica Witt, the Laboratory's Sustainability Manager, recently received a 2021 DOE Sustainability Award for her efforts as a Sustainability Champion. Under Witt's leadership for the past 10 years, the Laboratory reduced energy consumption by 8.3 percent (since 2015) and water consumption by more than 20 percent (since 2007).

"[Witt's] efforts and commitment to sustainability have been essential in ensuring DOE's continued success as a federal leader in sustainability," noted Scott L. Whiteford, director of DOE's Office of Asset Management.

In his nomination letter, Director of Utilities and Infrastructure Andrew Erickson explained that Witt has focused investments on the Laboratory's building portfolio, tacking projects such as replacing inefficient lighting systems and upgrading building controls to increase energy efficiency and improve facility operations,

Looking toward the future, Witt is working with the Lab's High Performance Computing Division to reduce the amount of potable water to cool the next generation of supercomputers. She is also developing a strategy to reduce water use across the Lab's campus.

To improve energy use in buildings, Witt worked with the Laboratory's Commissioning group to optimize the performance of heating and cooling systems in more than 40 facilities. She is currently developing a strategic plan for construction and design specifications for a "zero-energy-ready" facility construction process designed to reduce the Lab's future carbon emissions.

Laboratory Users Now Have New Source for Maps of Lab Buildings and Resources — LANL Locator

The Laboratory's Software and Applications Engineering Division recently retired a mapping tool called LocateIT, replacing it with a new source for maps with an app called LANL Locator. The new app provides users with a more efficient mechanism to find their way to Laboratory buildings and resources.

LANL Locator is a geographic information system (GIS)-based application that users can easily access from the Maps link on LANL's internal homepage. The app also has a mobile friendly version and a feature that measures areas and distances.

NNSA Leader Visits the Laboratory, Praises Mission Dedication and Perseverance During COVID-19

On August 26, 2021, Under Secretary of Energy for Nuclear Security Jill Hruby paid her first visit to the Laboratory since her confirmation as NNSA Administrator. Hruby's visit included private meetings with leadership and a tour of weapons facilities. She also addressed all Laboratory employees and Los Alamos Field Office staff during a town hall meeting.

In her town hall remarks, Hruby lauded the Laboratory's response to the COVID-19 pandemic, including the recent vaccination mandate and the significant contributions that its researchers and other experts provided as part of the federal response to battle the virus.

She also praised the Laboratory's dedication to mission delivery and cited its success in continuity of operations over the last 18 months, noting that the institution rapidly adjusted operations and maintained its effectiveness to complete mission milestones like the W88 Alt 370 First Production Unit and Phase 1.

Hruby touched on significant improvements to Laboratory infrastructure, including the Chemistry and Metal-

lurgy Research Replacement Plutonium Facility Equipment Installation, which wrapped ahead of schedule and $110 million under budget, and the eleven new facilities that will open this summer and fall.

Shipment of Glovebox Frees Up Space in the Plutonium Facility at TA-55

On September 20, 2021, Waste Management shipped an oversized box that contained a single glovebox removed from the Plutonium Facility (PF-4) earlier this year. Because heavy metals were present in the box, personnel managed the waste as mixed low-level waste. This waste was generated in May 2021, so the box was considered as newly generated, meaning that it was not on the Laboratory's Site Treatment Plan. The waste was shipped to a licensed and permitted commercial facility in Richland, Washington, where it will be treated and disposed.

With this shipment and a shipment of two additional gloveboxes in July 2021, the Laboratory has demonstrated that it has the processes in place to ship oversized waste that has been decontaminated and reclassed from transuranic/mixed transuranic to low-level waste/mixed low-level waste. Over the next six years, the Laboratory expects to generate approximately 150 similar waste boxes from decontamination and decommissioning activities during Plutonium Infrastructure Projects. With limited permitted storage space at TA-55, it is essential that the Laboratory maintain a disposal path for this type of waste to execute such shipments frequently.

Several organizations at the Laboratory contributed to the success of this shipment, including Nuclear Material Control & Accountability (SAFE-NMCA), Hazardous Waste Management (NPI-6), Hazardous Materials Management (NPI-7), personnel at TA-55, Radiation Protection TA55

Software and Applications Engineering Adopts Agile Culture

The Laboratory's Software and Applications Engineering (SAE) Division recently completed a strategic transformation that improves its performance and enhances customers' experience by adopting an Agile culture and delivery framework. Agile will help SAE deliver more customer value in a shorter period with higher quality. SAE's teams now work in short two-week iterations called "sprints" to deliver tested, working software during every iteration. Staff members incorporate best engineering practices, including daily communication with stakeholders and automated verification and validation of product requirements that ensure customer needs are met with faster delivery.

Ten Craft Workers Honored for Exemplary Safety

Every month, the Associate Laboratory Directorate for Facilities & Operations and the Associate Laboratory Directorate for Capital Projects (ALDCAP) recognize craft employees from ALDCAP who exemplify Safe Conduct of Research (SCoR) Principles in their work. These principles include safe attitudes, behaviors, and practices. These employees are recognized during ALDCAP's monthly all-hands meetings.

The most recent recognitions include two craft workers who paused work on new hand railings being fabricated at a Laboratory welding shop. These workers questioned whether the paint fumes during fabrication could ignite and/or be unsafe to breathe, given that welding and painting were taking place in close proximity to each other.

On a separate occasion, two craft carpenters paused installing sheetrock when they realized the energized light fixtures and outlets had not been Locked Out/Tagged Out. In another instance, a team of five craft electricians paused demolition activities in a laboratory when they observed safety-related housekeeping issues, including chemical hazards. Finally, a craft electrician was recognized for sharing his technical expertise regarding drill technology — which could help the Laboratory prevent mishaps — during a morning brief.

Each of these employees used SCoR Principles (attention to detail and a questioning attitude) to prevent possible incidents or injuries from occurring, and they were celebrated for embracing and exemplifying a culture of safety in their work.

Ventilation Upgrades in PF-4 Support Safety and Environmental Responsibility

Personnel seismically tested and anchored 12 variable-frequency drives to meet PC-3 (Safety Class) requirements. These new drives replace vintage motor-control components that have served the system, in addition to aging pneumatics. The replacements not

only eliminate legacy violations of the National Electric Code for working clearances but also represent a vast improvement in the Plutonium Facility's (PF-4) HVAC system.

PF-4's ventilation system delivers airflow from corridors and through laboratories to gloveboxes. Such delivery supports a cascading differential pressure in PF-4 from low to high probability for radioactive material contamination. A variable-frequency drive-control unit controls the fan motor, which in turn controls exhaust airflow.

Pressure differential transmitters monitor pressure differentials by sending signals to a controller that varies the position of control dampers and/or control fan variable frequency drives (fan motor speeds) to obtain and maintain desired differential pressures.

These control upgrades eliminated aging pneumatics used to control these systems. In essence, six different zones of control (redundant fans) were converted to full analog control. These conversions have enhanced reliability and reduced failure modes associated with the pneumatic components. The conversions also result in reduced power consumption and significantly lower noise (decibels). These outcomes make this equipment more environmentally responsible, as well as creating a more habitable and safer workplace.

WETF Leaders Recognize Professional Crews for Quick Repair of Water Leak

Leaders for the Weapons Engineering Tritium Facility (WETF) recognized crews from Utilities and Infrastructure (UI) and Maintenance and Site Services (MSS) for their professionalism and prompt repair of a water leak. These crews investigated the leak, identifying it as originating from a road outside WETF, which is located in Building 450 at TA-16. The crews quickly potholed into the ground, at which time personnel discovered a corroded pipe.

Having identified the leak's source, the crews isolated the water at the facility and excavated the pipe. The pipe had corroded because of its close proximity to an outside switchgear station. It turns out that the current returning to the electrical cabinet, which is south of the waterline, will find all available paths back to the cabinet, including the 6-inch waterline.

To correct the problem, the crews installed two 17-pound magnesium anodes on the main waterline's iron pipe, thus having the anodes corrode instead of the pipeline. This temporary repair—one that takes advantage of such sacrificial anodes—returned the building to service until a new section of line could be installed. Pipe clamps were also installed, mitigating the leak until repair was completed one week later. It took the crews one day to mitigate the leak and one day to complete the repair.

WEFT leaders noted that the UI and MSS crews' commitment was instrumental in getting the facility back online quickly, thus enabling normal operations to continue with minimal interruption.

COMMUNITY RELATIONS

DisrupTECH Helps Investors Learn More About Laboratory Tech-Transfer Technologies

On August 18, 2021, more than 140 entrepreneurs, investors, industry partners, and regional leaders attended (either virtually or in person) the Laboratory's DisrupTECH event to hear presentations from Lab scientists about marketable, innovative technologies.

The presentations included overviews of technologies such as more-comfortable radiation therapy, ultrasonic aerospace testing, and advancements in hydrogen fuel cells. Other technologies included artificial intelligence used to pinpoint gas-pipeline weaknesses, detection devices for planetary rovers, disease modeling, algae farming, and biodegradable plastics.

DisrupTECH is a joint project between the Laboratory's Feynman Center for Innovation and the New Mexico Start-Up Factory. The New Mexico Economic Development Department was also served as a sponsor.

The 2021 DisrupTECH award for Best Technology went to Kirti Bhardwaj for SafeRad: Making Safer Radiation Therapy Accessible for Cancer. This breakthrough technology minimizes the side effects of radiation treatments for cancer patients by eradicating only cancer cells, thus leaving healthy cells intact. Patients would not experience nausea, hair loss, or immunocompromization.

The award for Best Presentation went to Ian Cummings for ASSESS: A Rapid Full Structure Ultrasonic NDE Tool for the Aerospace Industry, a nondestructive and less-expensive technology compared to current methods.

Fourth Annual Quantum Summer School a Huge Success

Held from June 7 to August 13, 2021, this year's Quantum Computing Summer School has been the biggest yet, with 26 students selected from nearly 400 applications. These students used virtual technology to join Laboratory scientists for ten weeks of intense research. Students came from leading quantum-computing institutions from around the world, including the Massachusetts Institute of Technology, University of California Berkeley, and the University of Cambridge.

The annual summer school began with a series of talks that featured international experts, such as Andrew Childs, Ray Laflamme, and Jens Eisert. The students also learned about the current state of quantum-computing technology from an industrial point of view. For example, they attended presentations from companies such as Amazon Braket and Xanadu.

The core of the school consisted of student research projects. Mentors came from five Laboratory divisions as well as from the University of New Mexico. Each student worked with a pair of mentors on a quantum-computing project. The projects spanned many research areas, including quantum machine learning, new algorithms for quantum simulation, quantum chemistry, and error mitigation.

The workshop was attended by Laboratory staff, postdocs, and students from other schools. Several students extended their virtual stay at the Laboratory, with some students converted to graduate research assistants. Some student projects are already finished and received an arXiv (an open-access repository) posting, with many more papers to come in the coming months. The students enjoyed Laboratory-sponsored access to IBM quantum computers, as well as the use of High Performance Computing systems for heavy simulation tasks.

Laboratory's Bradbury Science Museum features in National World War II Museum Documentary

The Bradbury Science Museum features in the Manhattan Project Electronic Field Trip documentary, created by the National World War II Museum in New Orleans. Led by local students from across the country, the documentary tells the unique histories of the Manhattan Project and the people who dramatically changed science and society. Targeting middle and high school students, the program was watched by 80,000 students across the country when it was broadcast last year, and the documentary was one of this summer's Daytime Emmy nominees for Outstanding Daytime Non-Fiction Special. Watch the documentary here.

Lab Employees Volunteer to Tutor Middle-School Students in Española

The Laboratory's Community Partnerships Office is this year coordinating Lab volunteers to provide academic support to seventh- and eighth-grade students at Carlos Vigil Middle School in Española.

Collaborating with the Communities in Schools nonprofit organization, eight Laboratory volunteers will provide virtual one-on-one or small group support to students weekly for a minimum of one hour per week. These volunteers will concentrate on math, science, and language arts.

This tutoring qualifies for the use of the Laboratory's Community Involvement and Outreach Time program, which may pay for volunteer service time during working hours.

Laboratory Launches a Recruitment-Focused Billboard Campaign in Northern New Mexico

In a collaborative effort between the Associate Laboratory Directorate for Weapons Physics, the Human Resources Division, and the Communications and External Affairs Division, the Laboratory recently launched a billboard campaign in northern New Mexico to support the Lab's recruitment efforts.

The series of seven billboards, which are located along I-25 and US 285, feature Lab branding and photography that highlights workforce diversity with the tagline, "Careers for everyone. Visit lanl.jobs." The billboards serve as an extension of a campaign that spans both web and print materials to bring consistency and professionalism to the Laboratory's hiring pipeline.

Ohkay Owingeh and Pueblo de San Ildefonso Participate in Tour of Cultural Resource Sites on Lab Property

Pueblo leadership from Ohkay Owingeh recently joined leaders from Pueblo de San Ildefonso on a tour of cultural resource sites on Laboratory property. This visit was the first time that representatives from Ohkay Owingeh toured culturally significant properties located at the Laboratory.

Serving as the tour's guide was Cyler N. Conrad of the Laboratory's Environmental Stewardship group, along with Rosemary Maestas Swazo of Tribal Relations and Liaison for Communications & External Affairs. Also in attendance were NNSA Los Alamos Field Office representatives Erika Baeza-Wisdom, Darlene Rodriguez, and Don Ami.

The tour began with a visit to Tsirege Pueblo, located at TA-54, where Pueblo members took the opportunity to share a spiritual moment at one of the Tsirege kivas. The tour also included a visit to TA-72 (Los Alamos canyon), where there is a small archeological site off the main road. At this site there is a possible shrine (based on the formations found on the upright tuff rock). The tour did not manage to visit all planned sites, so there will likely be a second tour scheduled in the near future.

RDC Awards $35,000 to Tribal Businesses, with Support from Triad National Security, LLC

The Regional Development Corporation (RDC) announced the 2021 round of Tribal Economic Diversity Fund grant awardees, a program supported by the Laboratory's operator Triad National Security, LLC. This year, six businesses whose owners are members of San Ildefonso, Ohkay Owingeh, Taos, and Santa Clara pueblos received funding that ranged from $4,900 to $8,000. Triad supports the economic diversity activities of the RDC with an investment under its Community Commitment Plan.

The Tribal Economic Diversity Fund makes grant awards to tribal businesses that enable them to diversify, increase revenue, leverage other investments, create new jobs, and have systems in place that lead to growth. In addition, the RDC offers technical assistance to all applicants, whether or not they were awarded funding.

SELECTED MEDIA COVERAGE

DOE, Contractors Now Checking Vax Status; LANL Makes Vaccines Mandatory
Exchange Monitor (8/24)
Federal employees, embedded contractors and others at Department of Energy sites are now expected to divulge whether they have been vaccinated against COVID-19 — and the Los Alamos National Laboratory is requiring its personnel to be fully vaccinated.

New Colorado River Observatory Will Help Predict Droughts
Santa Fe New Mexican—Scott Wyland (8/24)
That data will be used to enhance Earth modeling so researchers from a 10-member consortium — of which Los Alamos National Laboratory is a member — can peg when, where, how and why snow and rain will fall to better predict the future availability of water, which is key to managing it in a drought.

So You Want to fly a Drone Over a Nuclear Weapons Lab
Defense News (8/24)
Drone pilots beware: Authorities at one of the United States' top nuclear weapons laboratories issued a warning Monday that airspace over Los Alamos National Laboratory is off limits.

Quantum Darwinism: Can Evolutionary Theory Explain Objective Reality?
New Scientist—Phillip Ball (8/25)
One of the most intriguing ideas now being tested, however, is that classical reality might emerge through a process analogous to evolution by natural selection.

Finalists for 2021 R&D 100 Awards are Unveiled
R&D World—Paul Heney (8/26)
Nine Los Alamos National Laboratory technologies have been selected as finalists for the R&D 100 Award.

New Mexico's Hospitals Days Away from 'Crisis Standards of Care' Amid COVID-19 Case Surge
KRQE-TV—Chris McKee (8/26)
Dr. Scrase says the state continues tracking along Los Alamos National Lab's worst-case scenario model for community spread. Those projections show by early September, the state will reach between 1,300 to 1,500 new COVID cases per day, and an average of 2 to 6 new deaths per day.

DOE/NNSA Leader Visits LANL Thursday, Praises Mission Dedication And Perseverance During COVID-19

Los Alamos Reporter (8/27)

Recently confirmed Under Secretary of Energy for Nuclear Security and Administrator of the NNSA, Jill Hruby lauded the Los Alamos National Laboratory's response to the COVID-19 pandemic and praised several significant infrastructure improvements in an address to all employees.

Predicting Mosquito Populations Before a Surge

Albuquerque Journal—Carrie Manore (8/28)

At Los Alamos National Laboratory, we're studying mosquito populations to understand how they grow, how they change with the seasons, and, in particular, how they spread infectious diseases to humans and other animals.

Triad Sets Oct. 15 Deadline for COVID-19 Vaccinations

Los Alamos Daily Post (8/29)

Triad National Security, LLC, has set Friday, Oct. 15 as the deadline for the COVID-19 vaccination requirement to go into effect. That means that by Oct. 15, all Triad employees and Triad's on-site contractors and on-site subcontractors at Los Alamos National Laboratory (LANL) must be fully vaccinated.

LANL Team Brings Expertise in Atmospheric Aerosols to New Snowpack Study Predicting Future of Western U.S. Water

Los Alamos Reporter (8/30)

A team from Los Alamos National Laboratory is about to launch research high in the Colorado Rockies that will help demystify water availability and support predictions across the arid West.

LANL's Test Launch Successful, Begins 5 Years of Data Collection

KRQE (9/1)

Scientists from Los Alamos are testing suborbital satellites at Spaceport America. The Los Alamos National Laboratory partnered with UP Aerospace in Colorado for an experimental launch last month.

Researchers Find Shock-Induced Mechanism for Creation of Organic Molecules Advancing Understanding of Emergence of Life on Earth

Los Alamos Reporter (9/1)

Researchers at Los Alamos National Laboratory, using a laser-driven compression technique and x-ray diffraction interrogation at the Stanford Linear Accelerator (SLAC) facility in California, have recently discovered a mechanism for the formation of complex carbon sheet-shaped solid molecules in liquid benzene, a common hydrocarbon, that could unravel some of the carbon formation mystery.

COVID-19 Cases, Hospitalizations Remain High

NM Political Report (9/2)

Modeling from Los Alamos National Labs for the state of New Mexico shows that the current surge of COVID-19 cases could peak soon.

Los Alamos Lab Working on Hydrogen-Powered Truck Project

Santa Fe New Mexican (9/5)

Diesel engines have been the norm for heavy-duty long-haul trucks since the mid-20th century. But the black smoke belching from the big rigs has become a growing concern as research shows diesel pollution is bad both for public health and the warming climate. Some Los Alamos National Laboratory researchers are working on a technology to clear this noxious pollutant from the roadways.

Mars Rover Grabs First Rock Sample, A Major Step In Hunt For Alien Life

National Geographic (9/6)

With the whirr of a drill, a robotic geologist some 244 million miles away just made history, collecting the first sample of Mars for return to Earth. Sealed in an airtight, ultraclean tube, the sample is an important milestone in a multibillion-dollar effort to finally answer the question: Was there ever life on the red planet? ..."We are going to be surprised," says Nina Lanza, a planetary scientist and team lead for Space and Planetary Exploration at Los Alamos National Laboratory.

LANL Leader Named a Department of Energy Sustainability Champion

Los Alamos Reporter (9/7)

Los Alamos National Laboratory's Sustainability Manager Monica Witt has received a 2021 Department of Energy (DOE) Sustainability Award for being a Sustainability Champion. Under her leadership, the Laboratory has reduced energy use by 8.3% since 2015 and water consumption by more than 20% since 2007.

Los Alamos National Laboratory Researchers Take On H_2 Truck Technology

Hydrogen Fuel News (9/8)

A team of Los Alamos National Laboratory researchers have been tasked with researching H2 truck technology to help develop fuel cells that will work well on large trucks. The goal is to come up with a viable alternative for diesel-burning engines.

Colorado Space Company Launches Test Rocket with Los Alamos National Laboratory
Denver Business Journal (9/9)
A Colorado aerospace company last month launched a successful research mission for Los Alamos National Laboratory from Spaceport America in New Mexico — a test that could be the first of many.

Effect of 'Eddy Killing' in Oceans is No Longer Matter of Guesswork
Mirage News (9/9)
In a U.S. Nation Science Foundation-funded paper in Science Advances, researchers at the University of Rochester and Los Alamos National Laboratory document for the first time how the wind, which propels larger currents, has the opposite effect on eddies less than 260 kilometers — resulting in a phenomenon called "eddy killing."

Answering the Call: How New Mexico's National Laboratories Used Science and Technology After 9/11 to Help Keep the Country Safe
Santa Fe New Mexican—Thom Mason and James Peery (9/10)
The terrorist attacks of September 11, 2001, changed all of us in ways big and small — from our sense of security to how we travel. For New Mexico's two national security laboratories, it meant quickly pivoting our scientific, engineering and technological resources to respond. As we reflect on the 20th anniversary, we're reminded of the continuing need to be ready and equipped to counter the evolving threats that face our nation.

Los Alamos National Lab Works on Hydrogen-Powered Trucks
KOB-TV (9/10)
There's been a big push in recent years to make roads a little greener – now Los Alamos National Lab has big plans for those big rigs.

Los Alamos National Lab Research Could Bring Hydrogen-Powered Semi-Trucks
KRQE-TV (9/13)
Scientists are working on the latest in clean energy technology right here in New Mexico. Los Alamos National Lab is working on getting commercial semi-trucks on the roads that are entirely powered by hydrogen.

Santa Fe Company Builds Teardrop Trailers Even a Subcompact Car Can Pull
Santa Fe New Mexican (9/13)
Irlanda collaborated with material science and dynamic extremes scientists at Los Alamos National Laboratory to determine the variance of strength in chicken feathers. This was through the New Mexico Small Business Assistance Program and the New Mexico Manufacturing Extension Partnership.

After Investing in Los Alamos National Lab Spinoff, Venture Capital Firm Partners with State on New $55M Fund
New Mexico Inno (9/14)
Scout Ventures and the state government have come together to raise a new fund to make investments in spinoffs from the U.S. Department of Defense and the national labs.

A Deadly Fungal Disease on the Rise in the West Has Experts Worried
Grist (/15)
A few years ago, Morgan Gorris, an Earth systems scientist at Los Alamos National Laboratory in New Mexico, decided to investigate an important question: What makes a place hospitable to Cocci?

News from Mars Comes to Downtown Los Alamos
Los Alamos Daily Post (9/16)
Mars is closer than you think. A stroll down Central Avenue in downtown Los Alamos can transport you to the surface of Mars via a slideshow of pictures taken by the Perseverance Rover, which is exploring Mars. A video screen is attached to a building that is part of Central Park Square, across the street from the former CB Fox Kidz and around the corner from Bennett's Fine Jewelry.

State of WMD: How 9/11 Impacted the Mission of National Security Laboratories
Homeland Security Today — Robert Webster and Nancy Jo Nicholas (9/16)
As we often like to say at Los Alamos: It takes a weapons lab to find a weapons lab – whether that lab is in a state-of-the-art facility inside our adversary's border, or in a shed tucked into a mountainside. In the decades to come, we know that we will continue to be called on to exercise that capability, as well as to develop other scientific and technological expertise to counter a broad range of other threats. In short, our job is far from over, and we're honored to have the privilege of doing that job daily in service to the nation.

A Speeding Object Collided with Jupiter and Blew Up, Cool Space Footage Shows
Mashable (9/18)
Astronomers and other researchers use this brightness to gauge the size of an impacting object, explained Cathy Plesko, a scientist at Los Alamos National Laboratory who researches asteroid and comet impacts. A

larger object creates a more energetic explosion and flash.

Researchers Testing Vaccine for Worldwide Swine Disease, PRRS

Mirage News (9/20)

The researchers will begin by generating sequences for PRRSV structural proteins using the Los Alamos National Laboratory's Mosaic Vaccine Tool Suite. This tool allows users to generate protein sequences that induce a high proportion of protective immune responses against multiple strains.

Scientists Study Microbiomes in Soil to Develop Drought Resistant Plants

KOB-TV (9/20)

This year's drought, to say the least, has been pretty bad for New Mexico. Back in April, more than 53% of the state was in the worst category of drought and thanks to a great monsoon season, that number has now dropped to 0%.

LANL Team One of 10 Recipients of $26 Million Department of Energy Award for Data Science

Los Alamos Reporter (9/21)

A Los Alamos National Laboratory research team's project was selected in a highly competitive $26 million Department of Energy (DOE) grant program to advance chemical and materials sciences by using data science.